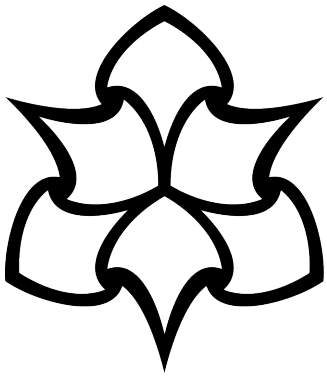

sustainability

MDPI

Article

Tracking the Interlinkages across SDGs: The Case of Hill Centered Education Network in Bogota, Colombia

Valeria Andreoni [1,*] and Valeria Ruiz Vargas [2]

[1] Business School, Future Economies Research Centre, All Saints Campus, Manchester Metropolitan University, Oxford Road, Manchester M15 6BH, UK
[2] Department of Natural Science, Ecology and Environment Research Centre, Manchester Metropolitan University, Chester Street, Manchester M1 5DG, UK; v.vargas@mmu.ac.uk
* Correspondence: v.andreoni@mmu.ac.uk

Received: 15 July 2020; Accepted: 22 September 2020; Published: 24 September 2020

Abstract: The main objective of this paper is to use the successful example of the Hill Centered Education Network in Bogota, Colombia, to discuss the role that education and bottom-up initiatives can have in the integrated implementation of the 2030 Agenda. Founded in 2015 by a team of three organisations, the Bogota Hill Network includes today more than 100 schools, 21 non-governmental organisations and three governmental agencies. Oriented to promote ecological conservation through education, the network uses the natural ecosystems of the city as a learning environment where collaborative projects are created and implemented. By involving a large number of pupils with different socio-economic and cultural backgrounds, the initiative has been able to promote equality and inclusion while developing environmental stewardship of students and communities. The achievements of the projects, together with the main opportunities and challenges, are used in this paper to map the interlinkages across targets and goals and to discuss the role of education in the development of integrated partnerships across a wide range of sustainability dimensions. From a policy perspective, the discussion of the bottom-up initiatives and the identification of successful examples can support the design of policies and the replication of sustainability initiatives.

Keywords: education; bottom-up approaches; urban regeneration; inclusiveness; interlinkages

1. Introduction

The Sustainable Development Goals (SDGs), adopted by the global community in September 2015, set an ambitious range of targets aiming to reach an integrated balance among socio-economic and environmental objectives [1]. Unlike the previous Millennium Development Goals (MDGs), the 2030 Agenda emphasizes the role of coordinated actions and aims to capture the interlinkages and dependencies existing between targets and goals [2]. Based on the idea that sustainability dimensions cannot be managed with a disconnected silo approach, the SDGs call for integrated policies across thematic and geographical areas [3]. A deep understanding of the interactions existing between the socio-economic and the environmental elements is then a key factor in the achievement of sustainability successes [4]. In addition, the possibility to design policies able to address more than one target at the same time is an opportunity for cost reduction and efficiency, as highlighted by United Nations [5,6].

Within this context, a system thinking approach, devoted to combine multifaced knowledge perspectives in the analysis of the sustainability interactions, has been largely used as theoretical and operational structure [7,8]. The interlinkages analysis and visualization tool, developed by the Institute for Global Environmental Strategies (IGES) [9] and the analytical frameworks proposed by

European Commission [10] and International Council for Science [11] are just some examples of the multidimensional efforts devoted to promote a better understanding of the spill over effects. In a similar way, a large number of studies, have been specifically devoted to investigating the interactions of specific targets and goals, such as the analyses focusing on the Nexus approach [12,13] on the Integrated Assessment Models [14], on the use of indicators [15] and global CGE Models [16]. As pointed out by Weitz et al. [17], these forward-looking modelling perspectives have mainly been used to investigate the interaction across targets and goals by (i) studying one specific goal to explore the relations with the others [18,19], (ii) grouping goals and targets to investigate the relationships existing among them [20], (iii) using scoring systems to analyse the interactions across the entire set of targets and goals [17,21,22]. The related studies have then been oriented to investigate the sustainability effects using theoretical approaches or by the development of modelling tools [23]. The identification of hypothetical links need, however, to be complemented by analysis of real-world situations. The development of case studies, specifically devoted to account for context-based circumstances, have then been advocated as a fundamental factor complementing the modelling approaches reported above [21].

Focusing on empirical rather than the hypothetical impacts, the case study approach provides a wide range of benefits. Firstly, the use of real examples of sustainability interactions makes easier to identify the interlinkages existing between targets and goals. Secondly, the possibility to perform pre- and post-evaluation of projects provides an important learning environment to compare the theoretical background used in the design of initiatives and the outcome generated by practices. Finally, the focus on bottom-up initiatives, developed through the participation of the local communities, can facilitate the identification of opportunities and constraints and promote the replication of good practices both at national and international levels [24–27].

It is within this context that the present paper develops. By presenting a case study of education for sustainable development projects implemented in primary school in Bogota, Colombia, the paper identifies examples of successful sustainability practices and contributes to the debate around replicability of bottom-up initiatives. The objective is to discuss the role of education in the integrated achievement of the SDGs by investigating the following research questions:

(1) Which are the main interlinkages that the education for sustainable development projects have generated across targets and goals?
(2) Which are the main opportunity and constraints related to the (i) design, (ii) implementation and (iii) replication of the education for sustainable development initiatives?

2. Methodology

To critically investigate the main synergies and trade-offs generated by education for sustainable development projects, two integrated methodological approaches have been used in this paper, namely: (i) case study analysis and (ii) interlinkages inventories. Following the definition proposed by Markus [28], a case study aims to investigate a contemporary phenomenon within its real-life context. By using a story telling approach, case studies are functional to identify opportunities and challenges and to support the definition of policies through the replication of practices. The interlinkages inventories, on the contrary, uses a combination of case study analysis and literature support to identify the direct and indirect connections existing between the considered phenomenon to the sustainability targets and goals. The case study included the analysis of documents provided by the Network founders, interview to Network founders, publicly available data from the Network's website and social media. The data were focused on the following key aspects for the development of sustainable development networks related to the education sector, as suggested by previous studies in the field [29–36]:

(a) Network's members;
(b) Network's objectives;
(c) Main Network's initiatives;

(d) Geographical space covered by the Network;
(e) Network's links to national and international policy frameworks;
(f) Challenges and opportunities of the Network's initiatives;
(g) Results from evaluation of the Network's work.

Within this methodological framework, the case study of the Hill Centered Education Network in Bogota, Colombia is presented and analysed in Section 3.1. Critical reflections around the potential and constraints of the sustainability educational projects are also included. In Section 3.2, the interlinkages inventories approach is used to map and discuss the interactions existing between the objectives of the case study considered in this paper and the SDGs.

3. Results

3.1. The Case of Hill Centered Education Network

Founded in 2015 by a team of three organisations, the Bogota Hills' Network includes today 100 schools (i.e., private and public), 21 non-governmental organization and 3 governmental agencies. The Network is the first initiative in the city that provides space for collaboration between these stakeholders. Devoted to promoting ecological conservation through education, the Network uses the natural ecosystems of the city as a learning environment, where collaborative projects are created and implemented. By involving a large number of students with different socio-economic backgrounds, the initiative aims to promote equality and inclusion while enhancing biodiversity and urban ecosystems regeneration. The participatory design of projects and activities is also contributing to develop leadership skills and environmental stewardship of students and communities.

During the last five years, a wide range of initiatives have been implemented, and examples are reported below:

(1) Organization of workshops on air and water quality where pupils from private and public schools have been invited to participate. The objective was to increase the environmental awareness around problems affecting the highly populated urban areas and to promote a collaborative environment between students from different socio-economic and cultural background.
(2) Opportunities for continuous professional development of the teaching staff. Meetings on education for sustainable development, focusing on the topics explored during the student workshops, have for example been organised to promote the development of consistent projects both within and between schools.
(3) Supporting the development of staff and pupils' skills for the use of citizen science tools such as iNaturalist and Water Monitoring. The Network has also created the concept of Network nodes based on the five watersheds in the city to develop and enhance collaboration around shared natural systems. Three nature reserves are free to use for educational purposes for the Network's members. These reserves include Reserve Mano de Oso which belongs to the Gimnasio Femenino, Reserve Umbral Cultural Horizontes owned by Bogota's Hills Foundation (Fundacion de Cerros de Bogota) and Reserve Venado de Oro owned by the Humboldt Institute (Figure 1).
(4) Development of a project designed in collaboration with the Instituto Nacional para la Biodiversidad (National Institute for Biodiversity), the Jardin Botánico de Bogotá (Bogotá's Botanical Gardens) and numerous schools' communities. By implementing actions oriented to promote biodiversity conservation through the restoration of urban ecosystems, the project is an example of successful practice aiming to reduce ecological degradation in high urbanisation areas. In addition, the direct involvement of local communities and the participation of a large number of students represents an important opportunity for data collection and knowledge co-creation.
(5) As required by the national policies of Colombia [30], the network has been able to develop Environmental School Projects (Proyectos Ambientales Escolares—PRAE) shaped in line with

the individual circumstances of schools [37]. National guidelines for the PRAEs suggest that the environmental project requires at least one staff member who has oversight and leads their environmental project. From experience through the Network, schools tend to limit staff engagement to one member. This is possibly due to national guidelines. However, the Network encourages less compartmentalised approaches by engaging other teachers than the PRAE leaders. This is done by providing continuous staff development for teachers from member institutions. This is one of the reasons why the Network complements the work of the national PRAE guidelines. In addition, PRAEs are a driver for the success of the network and the involvement of schools. This mutually complementary approach strengthens both national policy (i.e., PRAEs) and bottom-up approaches (e.g., the Bogota Hills' Network). The PRAE's policy framework focuses on environmental education [37]. Similarly, there is not yet active work led by the Network to transcend the environmental focus of the PRAEs. The Network works through a participatory approach and it is driven by the interests of its members. Therefore, this might suggest that schools in Bogota are rarely working beyond environmental education which is traditionally embedded in Colombia's educational system and policies. However, *"although there is not yet a holistic approach across schools (i.e., including economy, environmental and society as well as at levels of schools' activities) the SDGs seem to be encouraging a shift towards education for sustainable development"*, according to one of the Network's founders. This founder also suggested that *"the network might need stronger connections between individual schools"*. This information suggests that the Network has potential for more holistic and co-ordinated work.

(6) Development of small-scale social science research around the Network's activity [38]. This was a case study around the sustainable development related impacts of the work led by the Gimnasio Femenino which is one of the Network's school founders [38]. The aim of the research project was to find out if there was a ripple effect emerging from the environmental project in one of the Network's founding schools (i.e., Gimnasio Femenino). Key findings suggested that there was an emerging ripple effect in terms of knowledge and skills development reaching local communities including school's neighbours and parents, as well as teachers [38]. This was beyond the expected impact that the environmental project could have on pupils [38]. These findings suggest that there are impacts related to the SDGs that could be further explored. Additionally, these findings may suggest that school's stakeholders such as teachers, local community members, pupils and pupil's families could help accelerate the implementation of the SDGs through schools and school-centred network initiatives if there was a supportive context for it. The case study [38] resulted in a paper published and presented at two international conferences. This is important because it shows potential of the Bogota Hills' Network for sustainable development research in the context of primary and secondary education. There is a dearth of papers around this topic in Latin America (only 35 results on google scholar when searching for "school network" and "Latin America" and "education for sustainable development"; most of these papers mention—but are not the focus of—these concepts). Therefore, undertaking interdisciplinary research (including natural and social science) whilst supporting the network's activity can help provide innovative pathways for sustainable development implementation. Additionally, this research project was the starting point to build capacity in terms of social science research as well as interdisciplinary and participatory methods within the network. More research around the school network and their work is required to understand in more detail the potential of such initiatives and the potential for upscaling and replicating.

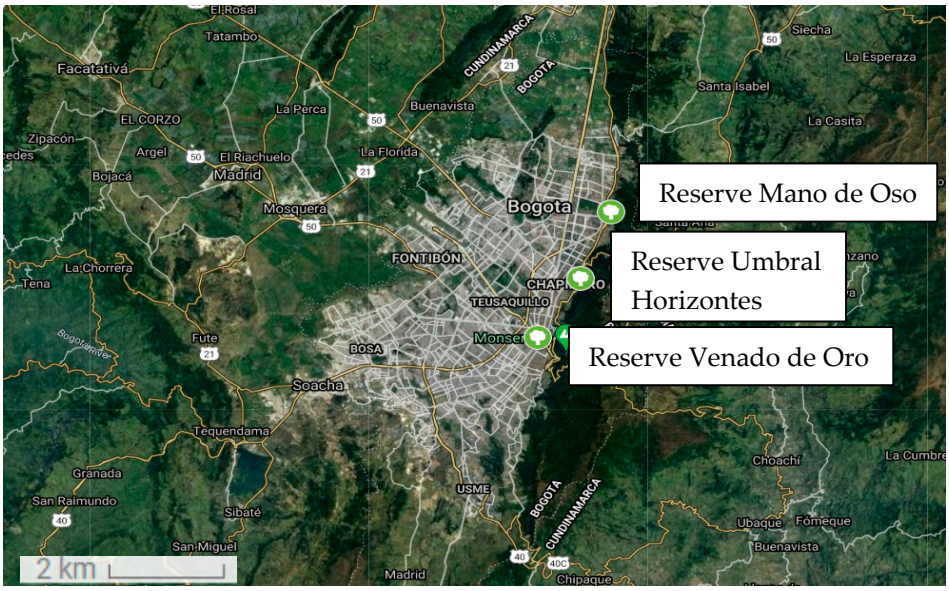

Figure 1. Location in Bogota of the Reserves Mano de Oso, Umbral Horizontes, Venado de Oro.

Although the Bogota Hills' Network has been actively leading education for sustainable development across Bogota, this is not without challenges. One of the founder members mentioned that "*The network cannot yet afford permanent members of staff and its activities depend on the voluntary work undertaken by staff from the member organisations. Also, the network does not have a long-term financial plan and depends on the work done by volunteering staff and support from the member institutions. In the future, the network would like to create a membership model for the network to be financially autonomous, whilst maintaining inclusivity and an equitable horizontal format. If this was possible, the network would aspire to employ a project co-ordinator in a long term or permanent basis. Other plans include the creation of a publicly accessible geographic information system with data collected by pupils, to work in strengthening school collaborations around micro basins, and to provide water monitoring kits to low income schools.*"

3.2. Interlinkages Inventories

Despite the challenges reported above, the presented case study represents a clear example of success where the objectives of the projects have been able to connect with a wide range of targets and goals, as required by the integrated partnerships of Goal 17. In Table 1, a reflective analysis of the potential interlinkages generated by the Hill Centered Education Project is compiled based on the use of an "explicit" and "inferred" methodological approach. Following the work previously conducted by Alcamo [23], "explicit" refers to the targets and goals that directly mention education in their text, while "inferred" uses evidence from literature to track the indirect connections. For the case study considered in this paper, 3 main achievements have been identified and for everyone one of them, the sustainability objectives and the interlinkages with the SDGs have been discussed.

Table 1. Mapping the interlinkages between the objectives of the Hill Centered Education Network and the SDGs.

By involving a wide range of organization and an extensive number of school, the project has been able to:	• **Objective:** 1) Promote inclusive educational opportunities for children with different socio-economic and cultural backgrounds. • **Interlinkages witht the SDGs:** Goal 1—No poverty; Goal 8—Decent work and economic growth (Target: 8.6); Goal 10—Reduce inequality (Target: 10.2); Goals 14 and 15. • **Supporting literature:** As highlighted by [39], education can play a fundamental role in poverty reduction, inequalities and growth. The possibility to create human capital, social participation and opportunities for emancipation is then considered as a key element for an integrated achievement of the SDGs. At the same time, the increased economic opportunities provide the space for a vicious cycle where prosperity can increase the educational possibilities from the private and the public sector [40]. Project on air and water quality have been oriented to support a more sustainable management of resouces.
By involving students in project design and evaluation, the initiative has been able to:	• **Objective:** 2) Promote a participatory, inclusive, mutual learning and democratic approach to problem solving and policy design. • **Interlinkages with the SDGs:** Goal 16—Peace, justice and strong institutions (Targets: 16.6; 16.7); Goal 17—Partnership for the goals (Targets: 17.16; 17.17). • **Supporting literature:** As reported by previous literature, democratic approach and participatory frameworks are fundamental elements for the achievement of the Agenda 2030 [41]. In the last few decades, extensive works have been published in the area of sustainable governance, and today, a common agreement exists in considering governance as a democratic, mutual learning and participatory approach where actors, processes, structures and institutions are expected to collaborate for the achievement of sustainability objectives [42–44].
By focusing on a wide range of environmental issues and by developing bottom-up activities focused on the resolution of local criticalities, the project has been able to:	• **Objectives:** 3) Improve the quality of education by promoting an interdisciplinary and problem-solving approach; 4) Improve students' awareness around sustainability challenges; 5) Improve the quality of the urban environment; 6) Facilitate the collection of data, the co-creation of knowledge and the development of good sustainability practices. • **Interlinkages with the SDGs:** Goal 4—Quality education; Goal 12—Responsible production and consumption (Target: 12.8); Goal 13—Climate action (Target: 13.3); Goal 11—Sustainable cities and communities (Targets: 11.4; 11.6); Goal 17—Partnership for the goals (Targets: 17.14; 17.16; 17.17). • **Supporting literature:** As previously reported by [45], "Education for sustainable development aims to empower people with values, skills and knowledge, which will help them become active agents for change in their own lives and in their wider society". Within this context, the development of systemic thinking, interdisciplinary capabilities and problem-solving approach are then fundamental elements in the management of the complex and interrelated sustainability challenges [46–50]. As recently reported by [51] citizen science, defined as the participation of individuals in the development of scientific and policy knowledge is today recognized as a fundamental factor for the Agenda 2030. The identification of local criticalities, together with the collection of data and the development of bottom-up approaches can then represent important aspects for problem resolution and for an integrated achievement of the sustainability objectives [46–48].

Source: Authors elaboration.

4. Discussion

SDG 4 *Quality Education* aims "to ensure inclusive and equitable quality education for all and promote lifelong learning". This aim seems to provide the basis for transformative education. However, authors such as [52] through their critical discourse analysis, argue that Agenda 2030 and the SDGs

prioritise economic growth and a utilitarian approach to education. Therefore, the potential that SDG4 provides to support transformative paths towards sustainable development [53] might be truncated by pro-growth and utilitarian approaches.

Nevertheless, education is deemed to be an important factor for driving the implementation of sustainable initiatives and the creation of a long-term sustainability ethics across the present and the future generations [54,55]. Education is a flexible tool that can involve a wide range of sustainability topics (e.g., water, air, equality, social development) and the achievements in every one of them will be able to generate spillover effects across all the other Goals [56]. In addition, the SDGs have been crucial in the active engagement of students in education for sustainable development [57] possibly as the SDGs present a tangible framework to support the understanding of the complexities around sustainable development. For these reasons, education for sustainable development is one of the most powerful tools for the implementation of the integrated partnership auspicated by the SDG17. Discussion around opportunities and constraints related to the (i) design; (ii) implementation, and (iii) replication of the education for sustainable development initiatives provides here, insights into the tangible aspects of these initiatives as a tool for implementation of the SDGs.

(i) Design

Integrating education for sustainable development into the curriculum, student experience and lifelong learning at any level of formal, informal and non-formal education is challenging. This is likely due to the holistic nature of education for sustainable development which includes a range of skills and knowledge [58] relevant to all areas of human development. Education for sustainable development skills include creative thinking, holistic or systems thinking, problem solving, teamwork and communication [59]. The knowledge required for education for sustainable development includes four areas: environment, society, economy and cross cutting knowledge [60]. A second factor that makes education for sustainable challenging is that some pedagogical approaches provide a more suitable ground to develop these skills and knowledge than others [61–64]. For instance, pedagogical approaches that favour authentic learning scenarios where students can be involved actively with local environmental aspects, nature or community engagement, are more likely to support students to develop problem solving skills as well as systems thinking skills. Although there is a shift towards more engaging, active, emancipatory and inclusive pedagogies, there is still a focus on didactic and passive pedagogies in education led by a neo-colonial system [65,66]. The third factor that makes education for sustainable development testing in the current educational paradigm is the transdisciplinary approaches required to address systemic changes towards and beyond sustainable development [67,68]. Schools work through disciplinary areas. Additionally, educational and organisational structures of educational sectors work in silos and networked approaches are slow to develop and require long term commitment and economic resources [29,30].

There are various ways to address these challenges. Firstly, other studies focused on sustainable development networks in the education sector show that a higher network density (i.e., more connections between members) could help develop a more holistic approach and systemic changes [30]. Secondly, previous studies show that it is possible to include a wide range of member organisations, including teacher training organisations, funding bodies, universities, environmental associations, which has also the potential to support a more holistic approach [29,30]. Therefore, further work in terms of the design of the Network can help to maximise the opportunities and minimise the constraints related to the Network's design.

(ii) Implementation

The case study shows that schools in Bogota do not seem to be working holistically to integrate sustainable development across all their activities. However, there is an emerging context that could be supportive of systemic integration of sustainable development (see Table 1). Some of the aspects that can support the implementation of sustainable development educational settings and their stakeholder

networks have been discussed by [29,30]. These key aspects have been used in the Table 2 reported below to show what is their status in the context of the Bogota Hills' Network case study:

Table 2. Status of key aspects that support the implementation of sustainable development in educational settings and their stakeholder networks.

Aspects that Can Support the Holistic Integration of Sustainable Development in Educational Settings and Their Stakeholder Networks (Adapted from Vargas et al., 2019a; 2019b)	Status in the Context of the Bogota Hills' Network Case Study (Section or Figure from the Case Study Presented Above)
National Policy Framework	PRAE National Policy (Section 3.1)
International Policy Framework	SDGs (Sections 3.1 and 3.2)
Organisational Policy Frameworks at schools in Colombia	Non-apparent (Section 3.1)
Stakeholder network with a governance or leadership structure, funding and high density	Emerging through the Bogota Hills' Network. The Network is still working on developing sustainable funding sources, increasing its density, and developing its leadership/governance structure (Section 3.1).
Focus on the whole spectrum of Education for Sustainable Development (i.e., Environment, Society and Economy, skills and knowledge)	Emerging—Currently focused on Environmental Education (Section 3.1).
Sustainable Development implementation at schools and through their stakeholder networks	SDGs 1, 4, 8, 10, 11, 12, 13, 16, and 17 (Table 1).
Bottom up activity	Established through the Bogota Hills' Network (Section 3.1).
Top down leadership	Established by nationally and internationally by policy frameworks (i.e., SDGs and PRAE policy)—Although schools are making the effort to have a member of staff focusing on the environmental projects (i.e., PRAEs) individual schools might need to further develop top down activity (Section 3.1).

The analysis of the case study shows that there are many levels of complexity when working to implement sustainable development through educational organisations. Case studies that show similar findings abound in the academic literature focused on schools [31–33] and other educational organisations such as universities [34–36]. However, despite the barriers and challenges suggested by the case study and the non-apparent or emergent status of key aspects that support the implementation of sustainable development through educational organisations and their stakeholder networks, the Bogota Hills' Network is in an instrumental position to support work towards SDGs' and sustainable development implementation (Tables 1 and 2). This is because schools are in a similar position than other educational organisations such as higher education institutions. They are central to social innovations and transformative learning which are key areas to support the regional transition paths to sustainable development [53].

(iii) Replication

Although the Network's activity does not cover all the SDGs and does not integrate education for sustainable development holistically yet, the network may have potential to do this. To do this a systemic, comprehensive and participatory study on the role and impact of the Bogota Hills' Network might need to be undertaken and followed by an action research project. In addition, the network's design and implementation could be replicated in similar settings which could support the understanding and implementation of the SDGs. To replicate the Network's design and implementation, the constraints and opportunities discussed above would need to be carefully considered in relation to the context where

a similar network would be developed. Whilst developing a similar network further research could be conducted for the design, implementation through a learning exchange experience between networks. This would support the development of the Bogota Hills' Network as well as the new similar networks whilst supporting and reinforcing the implementation of the SDGs. A sustainable development network case study of the United Kingdom's education sector which is one of the most developed in this area, shows that schools could have an active role in education for sustainable development initiatives [30]. In addition, the wide range of stakeholders in other sustainable development networks, such as in the United Kingdom which includes schools, show that school networks could be replicated and developed reaching wider key members and audiences nationally and internationally [30].

5. Conclusions

In this paper, the role of education as a factor of interlinkages across the SDGs has been analysed. By considering a case study of sustainable education projects in Bogota, Colombia, the connections existing between targets and goals have been considered and the main opportunities and constraints related to the (i) design, (ii) implementation and (iii) replication of the education for sustainable development initiatives have been analysed. The results show that the objectives of the projects have generated a wide range of interlinkages across SDGs. In particular, the multidimensional nature of sustainability education initiatives has been able to increase the environmental awareness of students and communities and to create a sustainability culture shaping the perceptions of the youngest generations. The development of bottom-up initiatives, characterized by the active involvement of local stakeholders, has also promoted the design of activities specifically devoted to tackle the main urban problems of the highly populated areas. The possibility to extend the proposed initiatives to a wider network of organizations, and the replicability of the good practices, can also contribute to complement the top-down sustainability approaches at national and international scales.

Despite these positive results, a wide range of challenges seems to exist. The design of holistic and transdisciplinary educational projects is for example in contrast with the disciplinary division traditionally characterizing the school education system. Within this context training support for teachers and educators have been proven to be an effective tool in increasing the system thinking approach and in the development of multidisciplinary educational initiatives. In a similar way, the passive learning techniques should be complemented by more engaging and emancipatory initiatives, where students are directly involved in the identification of the problems and in the design of solutions. From an implementation perspective, a better integration across the organizations of the network would be needed to holistically achieve the sustainability development objectives. In addition, the limited availability of financial support and the voluntary nature of the projects could compromise the long-term duration of the initiatives. When considering the replication possibilities, the bottom-up approach adopted by the Centered Education Network of Bogota, has the potential to be extended to other geographical areas. However, as previously reported by other studies [67,68], "local lens" should be adopted to evaluate the replicability opportunities of existing practices. In addition, the involvement of local stakeholders and the related values and perceptions would also need to be considered for the design of effective sustainability strategies.

By considering the main interlinkages existing across SDGs, the present paper highlights the importance of a holistic and multidisciplinary approach and considers the role of bottom-up initiatives. The discussion of opportunities and constraints, together with the identification of good practices can support the definition of similar initiatives and promote the integration of sustainability policies booth at national and international scale.

Author Contributions: Conceptualization, V.A. and V.R.V.; Methodology, V.A. and V.R.V.; Formal Analysis, V.A. and V.R.V.; Writing, V.A. and V.R.V. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments: The authors are very grateful for the discussions and information provided by the representatives of the founder member organisations of the Bogota Hills' Network in Colombia (https:

//redcerros.org/): Juana Figueroa, Gimnasio Femenino; Luis Camargo, Opepa; Diana Wiesner, Fundación Cerros. Their support has been crucial for the development of this paper.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. United Nations. *Transforming Our World: The 2030 Agenda for Sustainable Development*; A/RES/70/1; United Nations: New York, NY, USA, 2015.
2. United Nations. *The Millennium Development Goals Report*; United Nations: New York, NY, USA, 2015.
3. Norström, A.; Dannenberg, A.; McCarney, G.; Milkoreit, M.; Diekert, F.; Engström, G.; Fishman, R.; Gars, J.; Kyriakopoulou, E.; Manoussi, V.; et al. Three necessary conditions for establishing effective Sustainable Development Goals in the Anthropocene. *Ecol. Soc.* **2014**, *19*, 8. [CrossRef]
4. Nilsson, M.; Chisholm, E.; Griggs, D.; Chapman, R.; Mccollum, D.; Messerli, P.; Neumann, B.; Stevance, A.-S.; Visbeck, M.; Smith, M.S. Mapping interactions between the sustainable development goals: Lessons learned and ways forward. *Sustain. Sci.* **2018**, *13*, 1489–1503. [CrossRef]
5. United Nations. *Economic and Social Council. Ministerial Declaration of the 2018 High-Level Political Forum on Sustainable Development*; E/HLS/2-18/1; United Nations: New York, NY, USA, 2018.
6. United Nations. Connecting the Dots to Catalyze Change: Why Managing Interactions among SDGs is key to Sustainable Development. Statement from Wilton Park Roundtable, March 2018 to the UN High-Level Political Forum on Sustainable Development. 2018. Available online: https://www.sussex.ac.uk/ssrp/research/sdg-interactions (accessed on 15 July 2020).
7. Senneh, E.S. System Thinking for Sustainable Development. In *Climate Change and the Environment*; Springer: Berlin/Heidelberg, Germany, 2018.
8. Martín, E.G.; Giordano, R.; Pagano, A.; Van Der Keur, P.; Costa, M.M. Using a system thinking approach to assess the contribution of nature based solutions to sustainable development goals. *Sci. Total. Environ.* **2020**, *738*, 139693. [CrossRef] [PubMed]
9. IGES. Sustainable Development Goals Interlinkages and Network Analysis: A Practical Tool for SDG Integration and Policy Coherence. 2017. Available online: https://www.iges.or.jp/en/pub/sustainable-development-goals-interlinkages/en (accessed on 15 July 2020).
10. Miola, A.; Borchardt, S.; Neher, F.; Buscaglia, D. Interlinkages and policy coherence for the Sustainable Development Goals implementation. In *JRC Technical Reports*; European Commission: Luxembourg, 2019.
11. Nilsson, M.; Griggs, D.; Visbeck, M.; Ringler, C. *A Draft Framework for Understanding SDG Interactions*; International Council for Science: Paris, France, 2016.
12. Laspidou, C.; Mellios, N.K.; Spyropoulou, A.E.; Kofinas, D.T.; Papadopoulou, M.P.; Alexandra, S. Systems thinking on the resource nexus: Modeling and visualisation tools to identify critical interlinkages for resilient and sustainable societies and institutions. *Sci. Total. Environ.* **2020**, *717*, 137264. [CrossRef]
13. Galaitsi, S.; Veysey, J.; Huber-Lee, A. Where is the added value? In *A Review of the Water-Energy-Food Nexus Literature. SEI Working Paper*; Stockholm Environment Institute: Stockholm, Sweden, 2018.
14. Van Soest, H.L.; Van Vuuren, D.P.; Hilaire, J.; Minx, J.C.; Harmsen, M.J.; Krey, V.; Popp, A.; Riahi, K.; Luderer, G. Analysing interactions among Sustainable Development Goals with Integrated Assessment Models. *Glob. Transit.* **2019**, *1*, 210–225. [CrossRef]
15. Biggeri, M.; Clark, D.A.; Ferrannini, A.; Mauro, V. Tracking the SDGs in an 'integrated' manner: A proposal for a new index to capture synergies and trade-offs between and within goals. *World Dev.* **2019**, *122*, 628–647. [CrossRef]
16. Philippidis, G.; Shutes, L.; Barek, R.M.; Ronzon, T.; Tabeau, A.; Meijl, H. Snakes and ladders: Word development pathways' synergies and trade-offs through the lens of the Sustainable Development Goals. *J. Clean. Prod.* **2020**, *267*, 122147. [CrossRef] [PubMed]
17. Weitz, N.; Carlsen, H.; Nilsson, M.; Skånberg, K. Towards systemic and contextual priority setting for implementing the 2030 Agenda. *Sustain. Sci.* **2017**, *13*, 531–548. [CrossRef]
18. Vladimirova, K.; Le Blanc, D. Exploring Links between Education and Sustainable Development Goals Through the Lens of UN Flagship Reports. *Sustain. Dev.* **2016**, *24*, 254–271. [CrossRef]

19. Jaramillo, F.; Desormeaux, A.; Hedlund, J.; Jawitz, J.W.; Clerici, N.; Piemontese, L.; Rodríguez, J.A.R.; Anaya-Acevedo, J.A.; Blanco-Libreros, J.F.; Borja, S.; et al. Priorities and Interactions of Sustainable Development Goals (SDGs) with Focus on Wetlands. *Water* **2019**, *11*, 619. [CrossRef]
20. Collste, D.; Pedercini, M.; Cornell, S.E. Policy coherence to achieve the SDGs: Using integrated simulation models to assess effective policies. *Sustain. Sci.* **2017**, *12*, 921–931. [CrossRef] [PubMed]
21. Nilsson, M.; Griggs, D.; Visbeck, M. Policy: Map the interactions between Sustainable Development Goals. *Nature* **2016**, *534*, 320–322. [CrossRef] [PubMed]
22. Allen, C.; Metternicht, G.; Wiedmann, T. Prioritising SDG targets: Assessing baselines, gaps and interlinkages. *Sustain. Sci.* **2018**, *14*, 421–438. [CrossRef]
23. Alcamo, J. Water quality and its interlinkages with the Sustainable Development Goals. *Curr. Opin. Environ. Sustain.* **2019**, *36*, 126–140. [CrossRef]
24. Jiménez-Aceituno, A.; Peterson, G.D.; Norström, A.V.; Wong, G.Y.; Downing, A.S. Local lens for SDG implementation: Lessons from bottom-up approaches in Africa. *Sustain. Sci.* **2019**, *15*, 729–743. [CrossRef]
25. Smith, M.S.; Cook, C.; Sokona, Y.; Elmqvist, T.; Fukushi, K.; Broadgate, W.; Jarzebski, M.P. Advancing sustainability science for the SDGs. *Sustain. Sci.* **2018**, *13*, 1483–1487. [CrossRef]
26. OECD. *The Nature of Policy Change and Implementation: A Review of Different Theoretical Approaches*; OECD: Paris, France, 2013.
27. Hölscher, K.; Wittmayer, J.M.; Loorbach, D. Transition versus transformation: What's the difference? *Environ. Innov. Soc. Transit.* **2018**, *27*, 1–3. [CrossRef]
28. Markus, M.L. Case selection in a disconfirmatory case study in J. I. Case and P. In *The Information Systems Research Challenge: Qualitative Research Methods*; Lawrence, R., Ed.; Harvard Business School: Boston, MA, USA, 1989.
29. Vargas, V.R.; Lawthom, R.; Prowse, A.; Randles, S.; Tzoulas, K. Implications of vertical policy integration for sustainable development implementation in higher education institutions. *J. Clean. Prod.* **2019**, *235*, 733–740. [CrossRef]
30. Vargas, V.R.; Lawthom, R.; Prowse, A.; Randles, S.; Tzoulas, K. Sustainable development stakeholder networks for organisational change in higher education institutions: A case study from the UK. *J. Clean. Prod.* **2019**, *208*, 470–478. [CrossRef]
31. Olsson, D.; Gericke, N.; Rundgren, S.-N.C. The effect of implementation of education for sustainable development in Swedish compulsory schools—Assessing pupils' sustainability consciousness. *Environ. Educ. Res.* **2015**, *22*, 176–202. [CrossRef]
32. Prabawani, B.; Hanika, I.M.; Pradhanawati, A.; Budiatmo, A. Primary Schools Eco-Friendly Education in the Frame of Education for Sustainable Development. *Int. J. Environ. Sci. Educ.* **2017**, *12*, 607–616.
33. O'Flaherty, J.; Liddy, M. The impact of development education and education for sustainable development interventions: A synthesis of the research. *Environ. Educ. Res.* **2017**, *24*, 1031–1049. [CrossRef]
34. Blanco-Portela, N.; Pertierra, L.R.; Benayas, J.; Lozano, R. Sustainability Leaders' Perceptions on the Drivers for and the Barriers to the Integration of Sustainability in Latin American Higher Education Institutions. *Sustainability* **2018**, *10*, 2954. [CrossRef]
35. Blanco-Portela, N.; Benayas, J.; Pertierra, L.R.; Lozano, R. Towards the integration of sustainability in Higher Education Institutions: A review of drivers of and barriers to organisational change and their comparison against those found of companies. *J. Clean. Prod.* **2017**, *166*, 563–578. [CrossRef]
36. Niedlich, S.; Bauer, M.; Doneliene, M.; Jaeger, L.; Rieckmann, M.; Bormann, I. Assessment of Sustainability Governance in Higher Education Institutions—A Systemic Tool Using a Governance Equalizer. *Sustainability* **2020**, *12*, 1816. [CrossRef]
37. Ministerio de Ambiente y Desarrollo Sostenible. *Los Proyectos Ambientales Escolares -PRAE en Colombia. Viveros de la Nueva Ciudadanía Ambiental de un País que se Construye en el Escenario del Posconflicto y la Paz*; Bogotá, D.C., Ed.; Ministerio de Ambiente y Desarrollo Sostenible: Bogotá, Colombia, 2016.
38. Vélez, J.F.; Vargas, V.R.; Hoyos, L.M.; Prowse, A. Fostering Sustainable Communities and Resilient Cities Whilst Supporting 'Life on Land' Through a Colombian School's Initiative. In *Engaging Stakeholders in Education for Sustainable Development at University Level*; Springer Science and Business Media LLC: Berlin/Heidelberg, Germany, 2017; pp. 145–160.
39. UNESCO. Education 2030 Framework for Action. 2016. Available online: https://en.unesco.org/themes/education (accessed on 15 July 2020).

40. OECD. Growth: Building Jobs and Prosperity in developing countries. Available online: http://www.oecd.org/derec/?hf=5&b=0&q=growth+building+jobs+and+prosperity&s=score (accessed on 15 July 2020).
41. Glass, L.-M.; Newig, J. Governance for achieving the Sustainable Development Goals: How important are participation, policy coherence, reflexivity, adaptation and democratic institutions? *Earth Syst. Gov.* **2019**, *2*, 100031. [CrossRef]
42. Newig, J.; Challies, E.D.; Jager, N.W.; Kochskaemper, E.; Adzensen, A. The environmental performance of participation and collaborative governance: A framework of casual mechanisms. *Policy Study J.* **2018**, *46*, 269–297. [CrossRef]
43. Norris, P. *Making Democratic Governance Work*; Cambridge University Press (CUP): Cambridge, UK, 2012.
44. Treib, O.; Bähr, H.; Falkner, G. Modes of governance: Towards a conceptual clarification. *J. Eur. Public Policy* **2007**, *14*, 1–20. [CrossRef]
45. Didham, R.J.; Ofei-Manu, P. Adaptive capacity as an educational goal to advance policy for integrating DRR into quality education for sustainable development. *Int. J. Disaster Risk Reduct.* **2020**, *47*, 101631. [CrossRef]
46. Ofei-Manu, P.; Didham, R.J. Identifying the factors for sustainability learning performance. *J. Clean. Prod.* **2018**, *198*, 1173–1184. [CrossRef]
47. Lotz-Sisitka, H.; Wals, A.E.J.; Kronlid, D.; McGarry, D. Transformative, transgressive social learning: Rethinking higher education pedagogy in times of systemic global dysfunction. *Curr. Opin. Environ. Sustain.* **2015**, *16*, 73–80. [CrossRef]
48. Shulla, K.; Filho, W.L.; Sommer, J.H.; Salvia, A.L.; Borgemeister, C. Channels of collaboration for citizen science and the sustainable development goals. *J. Clean. Prod.* **2020**, *264*, 121735. [CrossRef]
49. Filho, W.L.; Shiel, C.; Paço, A.D.; Mifsud, M.; Ávila, L.V.; Brandli, L.L.; Molthan-Hill, P.; Pace, P.; Azeiteiro, U.M.; Vargas, V.R.; et al. Sustainable Development Goals and sustainability teaching at universities: Falling behind or getting ahead of the pack? *J. Clean. Prod.* **2019**, *232*, 285–294. [CrossRef]
50. Science Europe. Briefing Paper on Citizen Science. D/2018/13/324/2. 2018. Available online: https://www.scienceeurope.org/our-resources/briefing-paper-on-citizen-science (accessed on 15 July 2020).
51. Sachs, J.D. From Millennium Development Goals to Sustainable Development Goals. *Lancet* **2012**, *379*, 2206–2211. [CrossRef]
52. Brissett, N.; Mitter, R. For function or transformation? A critical discourse analysis of education under the Sustainable Development Goals. *J. Crit. Educ. Policy Stud.* **2017**, *15*, 181–204.
53. Radinger-Peer, V.; Pflitsch, G. The role of higher education institutions in regional transition paths towards sustainability. *Rev. Reg. Res.* **2017**, *37*, 161–187. [CrossRef]
54. United Nations. 57/254 Resolution Adopted by the General Assembly. 2002. Available online: http://www.un-documents.net/a57r254.htm (accessed on 15 July 2020).
55. United Nations. Roadmap for Implementing the Global Action Programme on Education for Sustainable Development. 2014. Available online: http://unesdoc.unesco.org/images/0023/002305/230514e.pdf (accessed on 15 July 2020).
56. UNESCO. Unpacking Sustainable Development Goal 4 Education 2030. 2017. Available online: https://unesdoc.unesco.org/ark:/48223/pf0000246300 (accessed on 15 July 2020).
57. Filho, W.L.; Tripathi, S.K.; Guerra, J.B.S.O.D.A.; Giné-Garriga, R.; Lovren, V.O.; Willats, J. Using the sustainable development goals towards a better understanding of sustainability challenges. *Int. J. Sustain. Dev. World Ecol.* **2018**, *26*, 179–190. [CrossRef]
58. Dawe, G.; Jucker, R.; Martin, S. Sustainable Development in Higher Education: Current Practice and Future Developments. A Report to the Higher Education Academy, York (UK). 2005. Available online: http://www.theacademy.ac.uk/assets/York/documents/ourwork/tla/sustainability/sustdevinHEfinalreport.Pdf (accessed on 15 July 2020).
59. Wiek, A.; Bernstein, M.; Foley, R.; Cohen, M.; Forrest, N.; Kuzdas, C.; Kay, B.; Withycombe Keeler, L. Operationalising competencies in higher education for sustainable development. In *Handbook of Higher Education for Sustainable Development*; Barth, M., Michelsen, G., Rieckmann, M., Thomas, I., Eds.; Routledge: London, UK, 2015; pp. 241–260.
60. Michalos, A.C.; Creech, H.; McDonald, C.; Kahlke, P.M.H. Knowledge, Attitudes and Behaviours. Concerning Education for Sustainable Development: Two Exploratory Studies. *Soc. Indic. Res.* **2010**, *100*, 391–413. [CrossRef]

61. Schuler, S.; Fanta, D.; Rosenkraenzer, F.; Riess, W. Systems thinking within the scope of education for sustainable development (ESD—A heuristic competence model as a basis for (science) teacher education. *J. Geogr. High. Educ.* **2017**, *42*, 192–204. [CrossRef]
62. Lozano, R.; Merrill, M.; Sammalisto, K.; Ceulemans, K.; Lozano, F.J. Connecting Competences and Pedagogical Approaches for Sustainable Development in Higher Education: A Literature Review and Framework Proposal. *Sustainability* **2017**, *9*, 1889. [CrossRef]
63. Andreotti, V.D.O. Global Citizenship Education Otherwise. In *Decolonizing Global Citizenship Education*; Springer Science and Business Media LLC: Berlin/Heidelberg, Germany, 2015; pp. 221–228.
64. Andreotti, V.D.O. The educational challenges of imagining the world differently. *Can. J. Dev. Stud. Rev. Can. d'études du développement* **2016**, *37*, 101–112. [CrossRef]
65. Haley, D. Undisciplinarity' and the Paradox of Education for Sustainable Development. In *Handbook of Sustainable Science and Research*; Leal, F.W., Ed.; Series, Climate Change Management; Springer: Berlin/Heidelberg, Germany, 2017.
66. Haley, D. Unconventional Educational Approaches: An Eco-pedagogy to Address Our Transformative Challenges. In *Encyclopedia of the UN Sustainable Development Goals*; Springer Science and Business Media LLC: Berlin/Heidelberg, Germany, 2020; pp. 917–929.
67. Reed, J.; van Vianen, J.; Sunderland, T. *From Global Complexity to Local Reality: Aligning Implementation Frameworks with Sustainable Development Goals and Landscape Approaches*; Center for International Forestry Research (CIFOR): Bogor, Indonesia, 2015.
68. Stephens, A.; Lewis, E.D.; Reddy, S. Towards an Inclusive Systemic Evaluation for the SDGs: Gender equality, Environments and Marginalized voices (GEMs). *Evaluation* **2018**, *24*, 220–236. [CrossRef]